
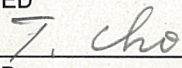
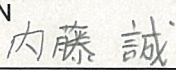


HISTORY				協議		
2012. 7. 1 施工前試験申請図書として作成						
				配布先		
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(TOTAL 8 SHEETS WITH COVER)						
		MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.				
SHIP & OCEAN PROJECT HQ.		PRODUCT NAME		TYPE		
		FineBallast MF				
BUSINESS DEVELOP. DEPT.		バラスト水管理システム 船上試験計画書				
APPROVED 						
CHECKED						
PREPARED						
DRAWN 		SHIPBOARD TESTING PLAN DOCUMENT				
DATE						
JOB NO.	JOB CLASSIF. No.	SCALE	DRAWING No.			
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# Shipboard Testing Plan

## 1. Scope

This document describes a plan to perform the shipboard testing of the “FineBallast<sup>®</sup> MF” ballast water management system (BWMS) according to provisions in “[7] Shipboard Testing” of the Ballast Water Management System Pre-service Test Criteria.

## 2. Ship Used for the Shipboard Testing of the BWMS

Owner: Mitsui O.S.K. Passenger Line, Ltd.

Registry: Tokyo, Japan

Name: “NIPPON MARU” (passenger liner)

Ballast water rated flow: 200m<sup>3</sup>/hr

Ballast tank capacity: 31.0 to 542.1m<sup>3</sup> (Total: 2158.2 m<sup>3</sup>)

## 3. Test Schedule and the Number of Iterations

The performance testing should be carried out from July to September 2012. During this test period, the BWMS operation status should be recorded whenever BWMS is employed for ballast-related operations on the ship.

## 4. Ship's Routes during the Shipboard Tests

The testing of the BWMS should be done during the ship's irregular voyages between Japanese and Korean ports. The testing of the BWMS should not be done while the ship is on a cruise around the world.



## 5. Ballast Tanks

Table 5-1 lists the capacities of the ship's ballast tanks. Given that the BWMS is operated for about two hours at a time during the test, it has been decided in consideration of the capacities and purposes of different ballast tanks that Water Ballast Tank (W.B.T.) No. 2 should be used for storing the treated water and that water from Water Ballast Tank (W.B.T.) No. 5 should be used for storing control water (untreated water serving as control sample).

Table 5-1 Ballast tank capacities

NO.	ITEMS	SIDE	CAPACITY	USE	PLAN
1	FORE PEAK WATER BALLAST TANK	ATH	289.7 m <sup>3</sup>		
2	NO. 2 WATER BALLAST TANK	ATH	542.1 m <sup>3</sup>		<b>Treated water</b>
3	NO. 3 WING WATER BALLAST TANK	P	111.4 m <sup>3</sup>	F. W. T.	
4	NO. 3 WING WATER BALLAST TANK	S	111.4 m <sup>3</sup>	F. W. T.	
5	VOID SPACE (RESERVE WATER BALLAST TANK)	P	72.8 m <sup>3</sup>		
6	VOID SPACE (RESERVE WATER BALLAST TANK)	S	72.8 m <sup>3</sup>		
7	NO. 4 DOUBLE BOTT. WATER BALLAST TANK	P	31.0 m <sup>3</sup>		
8	NO. 4 DOUBLE BOTT. WATER BALLAST TANK	S	31.0 m <sup>3</sup>		
9	NO. 5 DOUBLE BOTT. WATER BALLAST TANK	P	122.6 m <sup>3</sup>	GRAY W.	<b>Raw water (control water)</b>
10	NO. 5 DOUBLE BOTT. WATER BALLAST TANK	S	118.0 m <sup>3</sup>	GRAY W.	<b>Raw water (control water)</b>
11	NO. 6 DOUBLE BOTT. WATER BALLAST TANK	C	141.4 m <sup>3</sup>	BLACK W.	
12	NO. 7 DOUBLE BOTT. WATER BALLAST TANK	ATH	111.2 m <sup>3</sup>		
13	NO. 8 WATER BALLAST TANK	P	121.3 m <sup>3</sup>	GRAY W.	
14	NO. 8 WATER BALLAST TANK	S	121.3 m <sup>3</sup>	GRAY W.	
15	AFT PEAK WATER BALLAST TANK	P	80.1 m <sup>3</sup>		
16	AFT PEAK WATER BALLAST TANK	S	80.1 m <sup>3</sup>		



## 6. Test Method

### 6.1. Overview of the testes system

Fig. 6.1-1 is a simplified flow diagram of the tested system. All components comprising the tested system exist in the auxiliary machinery room.

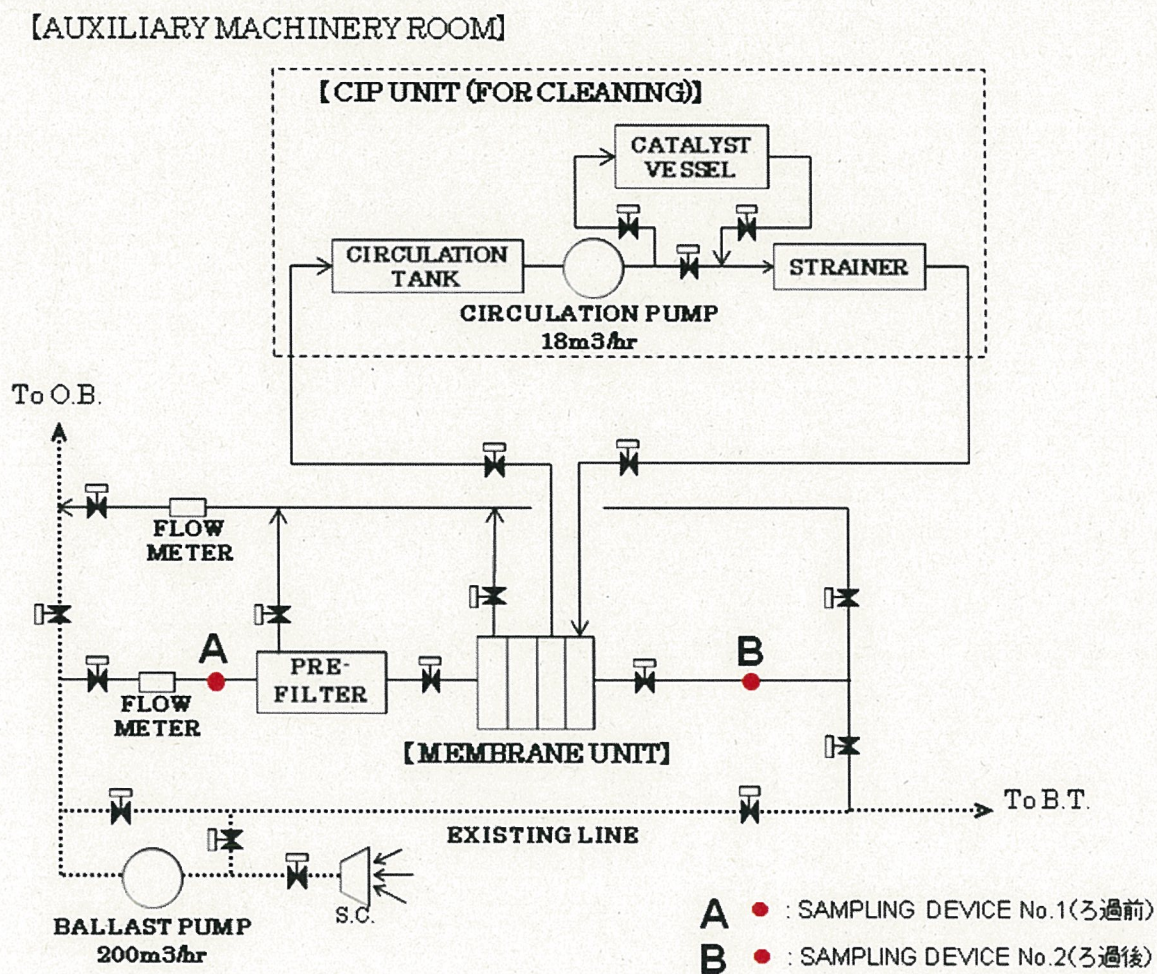


Fig. 6.1-1 Simplified flow diagram of the tested system



## 6.2 Sampling method

Samples for use in various analyses are collected using a sampling nozzle as per Drawing E-09-00, "Sampling Nozzle." The sampling nozzle is designed to make the velocity of the flow of sampled water through the sampling line equal to the velocity of the flow of water through the ballast water line (isokinetic sampling).

Fig. 6.2-1 illustrated the flow of water during the uptake of ballast water.

As shown in Fig. 6.2-1, the untreated water to the control water tank (W. B. T. No. 5) is sampled using a sampling nozzle at Position A and the treated water to the treated water tank (W. B. T. No. 2) is sampled using a sampling nozzle at Position B.

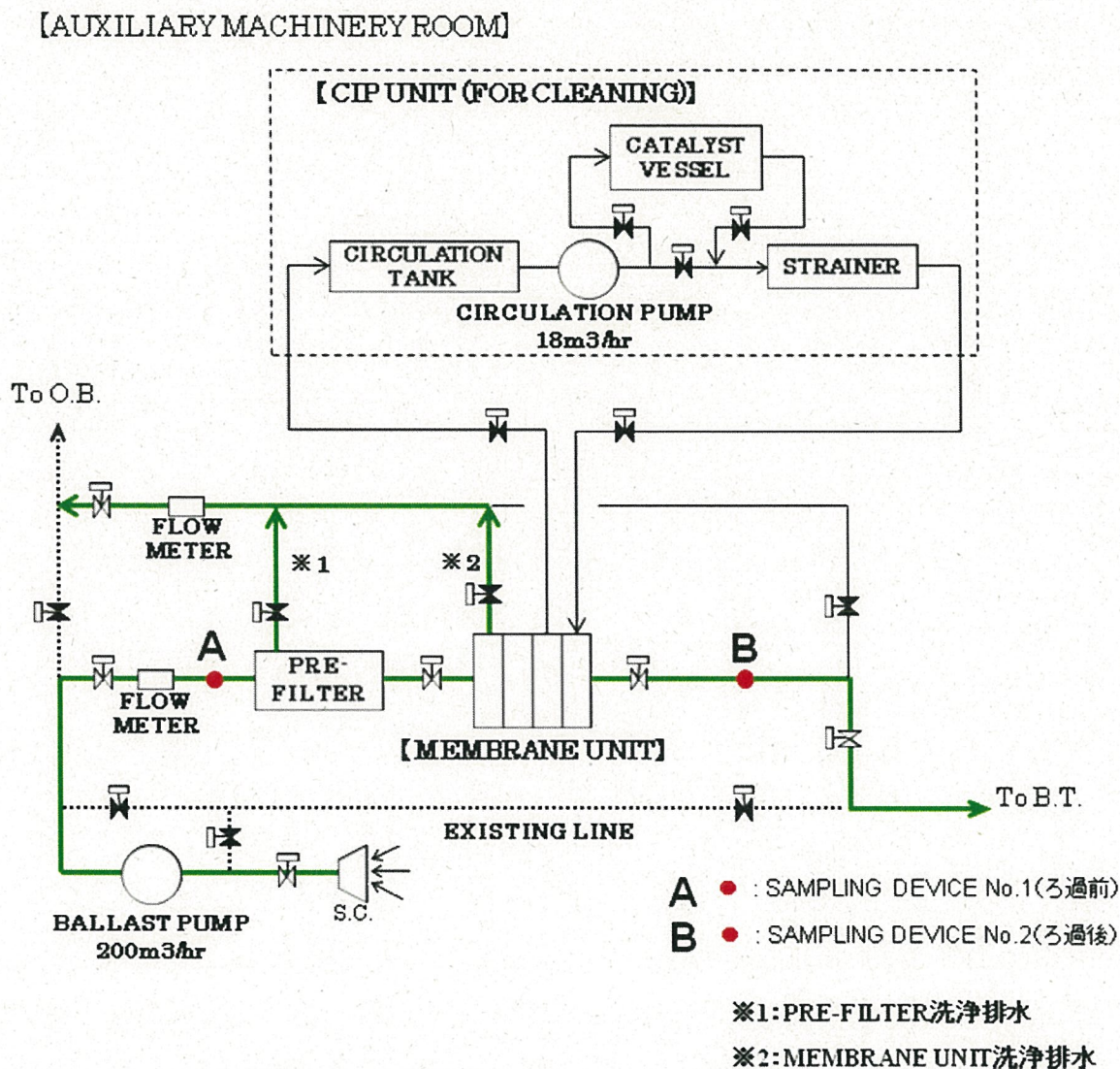


Fig. 6.2-1 Flow during the uptake of ballast water.

- ・ (ろ過前) : (before filtering)
- ・ (ろ過後) : (after filtering)
- ・ PREFILTER 洗浄排水 : Water used in the cleaning of the prefilter
- ・ MEMBRANE UNIT 洗浄排水 : Water used in the cleaning of the membrane unit



Fig. 6.2-2 illustrated the flow of water during the discharge of ballast water.

As shown in Fig. 6.2-2, the ballast water from the control water tank (W. B. T. No. 5) is sampled using a sampling nozzle at Position A and the ballast water from the treated water tank (W. B. T. No. 2) is sampled using a sampling nozzle at Position B.

**[AUXILIARY MACHINERY ROOM]**

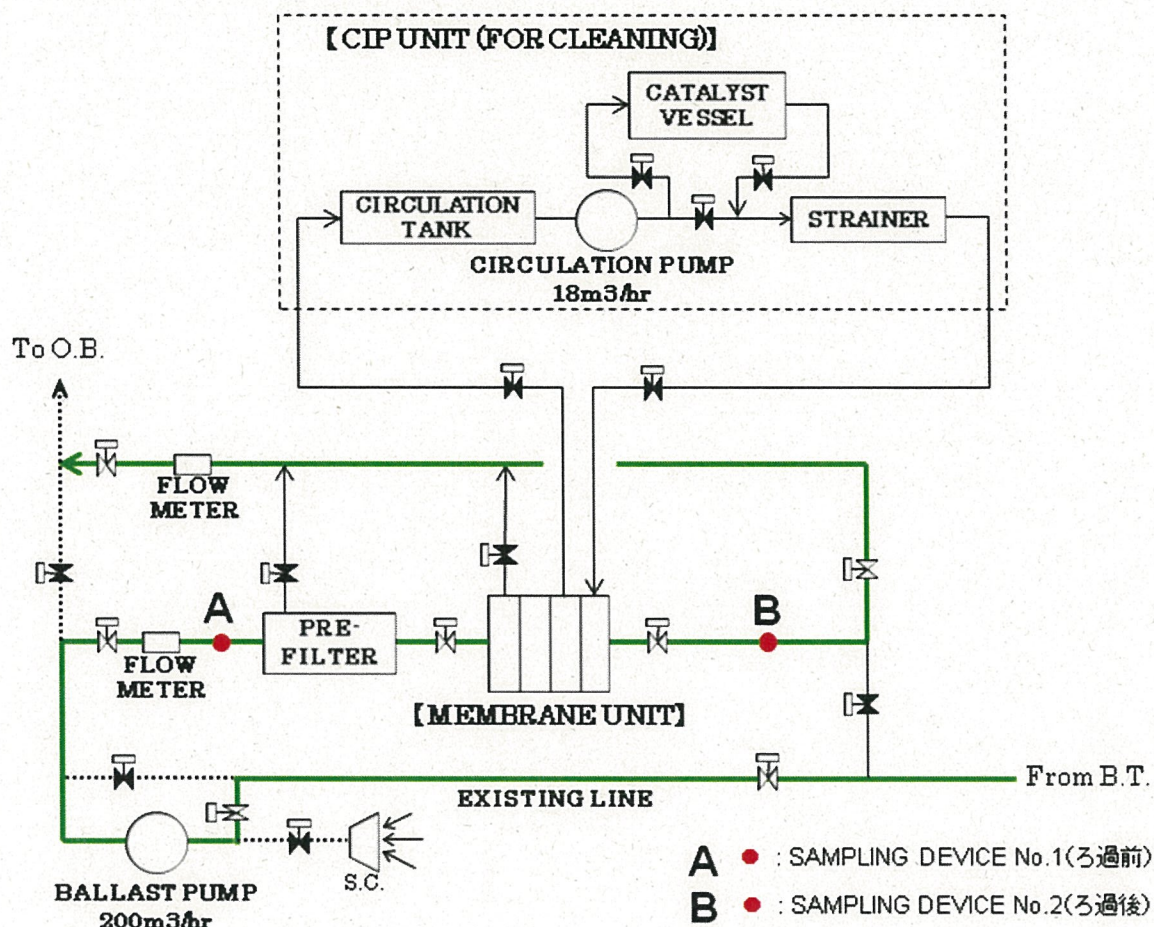


Fig. 6.2-2 Flow during the discharge of ballast water.

- ・ (ろ過前) : (before filtering)
- ・ (ろ過後) : (after filtering)

The sampling method should be as instructed by “[7] Shipboard Testing” of the Ballast Water Management System Pre-service Test Criteria. The following provisions should be observed with regards the target tanks, sampling schedule, sampling timing/frequency, sampling regime and size:



(1) Target users

The target tanks should be as described in Section 3 “Ballast Tanks.”

(2) Sampling schedule and frequency

1) Ballast water in the control water tank (untreated water for comparison referred to as “raw water” or “control water”)

i) During ballast water uptake

Three times: early, in the middle and late during the ballast water uptake operation

ii) During ballast water discharge

Three times: early, in the middle and late during the ballast water discharge operation

2) Ballast water after treatment (“treated water”)

Three times: early, in the middle and late during the ballast water discharge operation

(3) Sampling regime and sample size

Following the schedule and frequency as per (2) “Sampling schedule and frequency,” samples of the following sizes, containing the target organisms that are also described below, should be collected:

1) Viable organisms greater than or equal to 50µm minimum dimension (L-size group organisms)

Sample 1m<sup>3</sup> and concentrate it into the volume of approx. 500mL using a sampling device.

2) Viable organisms greater than or equal to 10µm but less than 50µm in minimum dimension (S-size group organisms)

Liquid volume: 1L (minimum)

3) Bacteria

Liquid volume: 500mL (minimum)

4) Water quality [salinity, water temperature, particulate organic carbon (POC) and total suspended solids (TSS)]

The salinity and water temperature should be measured using instruments when samples are collected. A water sample for water quality analysis should be 2L or larger.

### 6.3 Analysis methods

The methods used in various analyses should be as prescribed in “2. Analysis Methods” of the Quality Assurance Project Plan (QAPP). The water quality analysis methods for POC and TSS are detailed in this document.

Since a BS2 analyzing laboratory for the analysis of bacteria, etc., cannot be set up on the ship, samples collected on the ship for analysis should be unloaded at port and transported as soon as possible to a BS2 analyzing laboratory on land for prompt analysis.

### 6.4 Other items requiring documentation

The following should be documented during the test:

i) Flow rate of the treated water taken into the treated water tank and of the untreated water taken into the control water tank

ii) Flow rate of water discharged from the treated water tank and the control water tank



- iii) Volume of treated ballast water stored in the treated water tank and of the untreated ballast water stored in the control water tank
- iv) Name and capacity of the ballast tank storing the treated water and of the ballast tank storing the control water
- v) Places (ports) of ballast water uptake and discharge
- (vi) Flow of water into sampling devices during sampling
- (vii) Report on occurrence or absence of system trouble with descriptions of system troubles if any
- (viii) Other relevant information

## 7. System Operation Logging

During this test period, the BWMS operation status should be recorded whenever BWMS is employed for ballast-related operations on the ship.

The information that requires logging should be as described in Section 6.4 “Other items requiring documentation.”

## 8. test Schedule

Table 8-1 shows the performance testing schedule.

If the tests performed within this schedule fail to obtain three sets of valid data, additional tests should be performed as required:

Table 8-1 Test schedule for fiscal 2012

No.	Route	Date of ballast water uptake (and treatment)		Date of ballast water discharge		Ballast water storage duration
		Port	Scheduled date (Y/M/D)	Port	Scheduled date (Y/M/D)	
1st	Yokohama - Hachijo-jima - Yokohama	Yokoyama	2012/7/19	Yokoyama	2012/7/21	3 days
2nd	Nagoya - Yokoyama	Nagoya	2012/7/30	Yokoyama	2012/8/1	3 days
3rd	Yokohama - Yokohama (spare)	Yokoyama	2012/8/1	Yokoyama	2012/8/2	2 days
4th	Yokohama - Akita - Aomori - Yokohama	Yokoyama	2012/8/2	Yokoyama	2012/8/7	5 days
5th	Yokohama - Tateyama - Yokohama	Yokoyama	2012/8/8	Yokoyama	2012/8/9	2 days
6th	Harumi - Kozu-shima - Harumi	Harumi	2012/8/20	Harumi	2012/8/22	3 days
7th	Yokohama - Ogasawara - Yokohama (spare)	Yokoyama	2012/9/14	Yokoyama	2012/9/16	3 days
8th	Yokohama - Tokachi - Yokohama (spare)	Yokoyama	2012/9/20	Yokoyama	2012/9/25	6 days

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